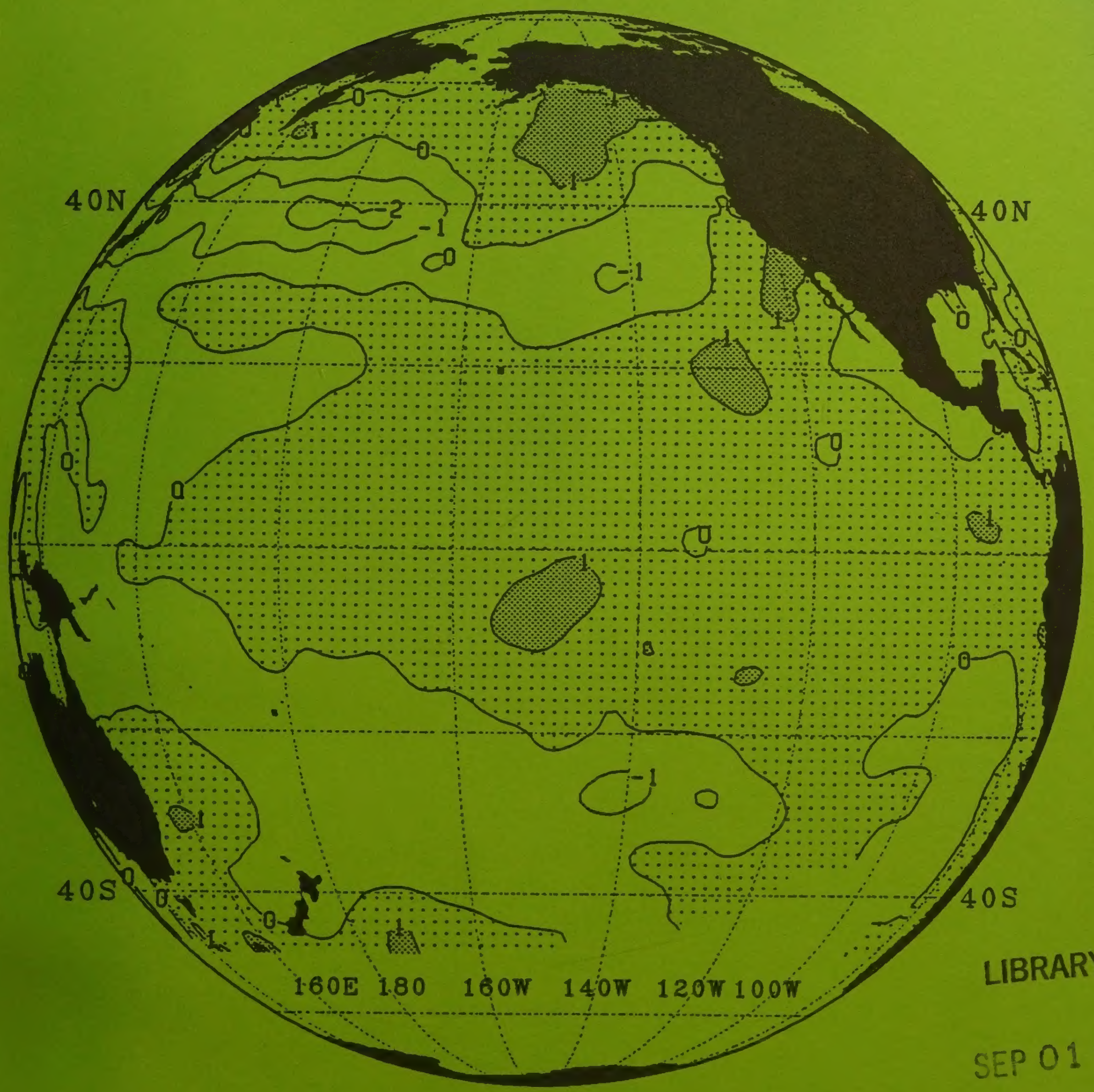
気象庁海洋月報

Monthly Ocean Report

July 1993 (No.7)



El Niño Monitoring Center
Japan Meteorological Agency

気象庁海洋気象部海洋課
エルニーニョ監視センター

平成5年7月

気象庁海洋月報は、気象庁海洋気象部海洋課エルニーニョ監視センターで
作成されています。本月報に関する問い合わせは、
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Monthly Ocean Report is prepared by the El Niño Monitoring Center (ENMOC), Oceanographical Division, Marine Department, Japan Meteorological Agency.

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表紙は1993年７月の太平洋の月平均海面水温偏差図です。
陰影部は平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for July 1993 in the Pacific Ocean. Areas of positive anomalies are shaded.

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海況の特徴（1993年7月）

太平洋の海況

太平洋赤道域の海面水温は、170°E以東では平年より0.5℃以上高い状態が続いたが、正偏差の大きさは6月より小さくなり、平年より1℃以上高い海域は150°W及び100～90°W付近に限られ、135°W付近では負偏差が現れた。エルニーニョ監視海域(4°S～-4°N，150°W～90°W）の海面水温偏差は、+0.6℃で6月より小さくなった。一方、西部では平年並だった（第1表、第1図、第6図）。

赤道域の20℃の深度は西部では変化がないが、中部では浅くなる傾向が現れた(第9図）。

気象庁の海洋気象観測船「凌風丸」は本年7月、日本近海から赤道域に至る東経137°Eに沿う海洋観測を行った。その結果、3～10°Nにかけての28℃以上の暖水層の厚さは平年及び昨年より薄かった。また、5°N付近を中心とする水温躍層の南北勾配は昨年より強く、東向きの北赤道反流が昨年よりも強いことを示唆している（図 A）。これらの状態は全般に1991年の同時期の観測結果に類似している。

北太平洋の海面水温は、30～45°Nの日本近海から北米沖まで帯状に平年より低く、日付変更線付近では平年より2℃以上低かった。アラスカ湾及びカリフォルニア半島沖では平年より1℃以上高い状態が続いたが、メキシコ西岸沖は負偏差に転じた(第1図）。

日本近海の海況

日本近海の海面水温は、南西諸島付近を除いて全般に平年より1℃以上低く、本州東方、本州南岸及び対馬海峡では2℃以上低かった。一方、南西諸島からフィリピン近海にかけての海面水温は30℃前後で平年より0.5℃以上高かった（第17図）。

黒潮は、九州・四国に沿って流れた後、紀伊半島沖から33°Nに沿って東に流れ、中旬まではほぼ141.5°E線に沿って北上し房総半島に接岸した後、東に流れていたが、下旬には八丈島付近から北東に向かい房総半島から大きく離岸して流れていた（第20図）。

本州東方の親潮系の冷水（深さ100mで5℃以下）の沿岸寄りの分枝は、39.3°N・142.8°Eまで、沖合の分枝は、38.5°N・144.5°Eまでそれぞれ南下していた（第19図）。

熱帯の気象

今月も対流活動は日付変更線付近では平年より活発だった。西部熱帯太平洋域では対流活動は不活発だったが先月よりは平年並の状態に近づいた。赤道太平洋域の東西風偏差は上層(200hPa）では西風偏差、下層（850hPa）では東風偏差となったところが多く、先月までの傾向と比べ変化が現れた。ＳＯＩは-1.0と負の値が続いている（第1表、第12図、第13図）。［気象庁長期予報課提供］

HIGHLIGHTS July 1993

Pacific

Sea surface temperatures (SSTs) in the equatorial Pacific continued to be more than 0.5°C above normal east of 170°E, however the strength of the anomalies has reduced since June. The SST index for region B (refer to Fig.6) was +0.6°C which was smaller than the last month. SSTs in the western equatorial Pacific continued to be normal (Table 1 and Figs.1, 6).

The depth of the 20°C isotherm along the equator (refer to Fig.9) did not change in the western Pacific, however it was shallower than June in the central Pacific.

According to the oceanographic observations in July by R/V Ryofu Maru of the JMA from 3°N to 34°N along the meridian of 137°E, the thickness of the surface warm water (warmer than 28°C) from 3°N through 10°N was thinner than both normal and the last summer. The gradient of the thermocline around 5°N was steeper than the last summer, suggesting that the North Equatorial Countercurrent was stronger. These conditions were similar to those in 1991 at the same season (Fig. A).

In the North Pacific Ocean, negative SST anomalies prevailed between 30°N and 45°N from around Japan to off North America. SSTs were 2°C below normal around the date line. SSTs in the Gulf of Alaska and off Baja California continued to be 1°C above normal,but SSTs off west of Mexico changed to below normal(Fig.1).

Seas adjacent to Japan

SSTs in seas adjacent to Japan were more than 1°C below normal except around the Nansei Islands. SSTs were more than 2°C below normal east and south of Honshu and at the Tsushima Channel in particular. SSTs from the Nansei Islands to seas adjacent to the Philippines were around 30°C, more than 0.5°C above normal (Fig.17).

The Kuroshio flowed along the coasts of Kyushu and Shikoku, and flowed eastward along 33°N. By the middle of July, it flowed northward along 141.5°E and passed near the Boso Peninsula. At the end of July, it flowed northeastward from the Hachijo Island to far off the Boso Peninsula (Fig.20).

Coastal and off coastal branches of the Oyashio cold water (colder than 5°C at a depth of 100m) extended southward to 39.3°N, 142.8°E and 38.5°N, 144.5°E, respectively (Fig.19).

Atmospheric conditions in the tropics

Convective activities near the date line have been stronger than normal. On the other hand, those over the western tropical Pacific have been weaker than normal, although not as weak as previous months. Low level easterlies changed to easterly anomalies over the central and eastern equatorial Pacific. However, the SOI remained negative (-1.0).

[prepared by the Long-range Forecast Division, JMA]

Depth-Latitude Section of Temperature along 137°E

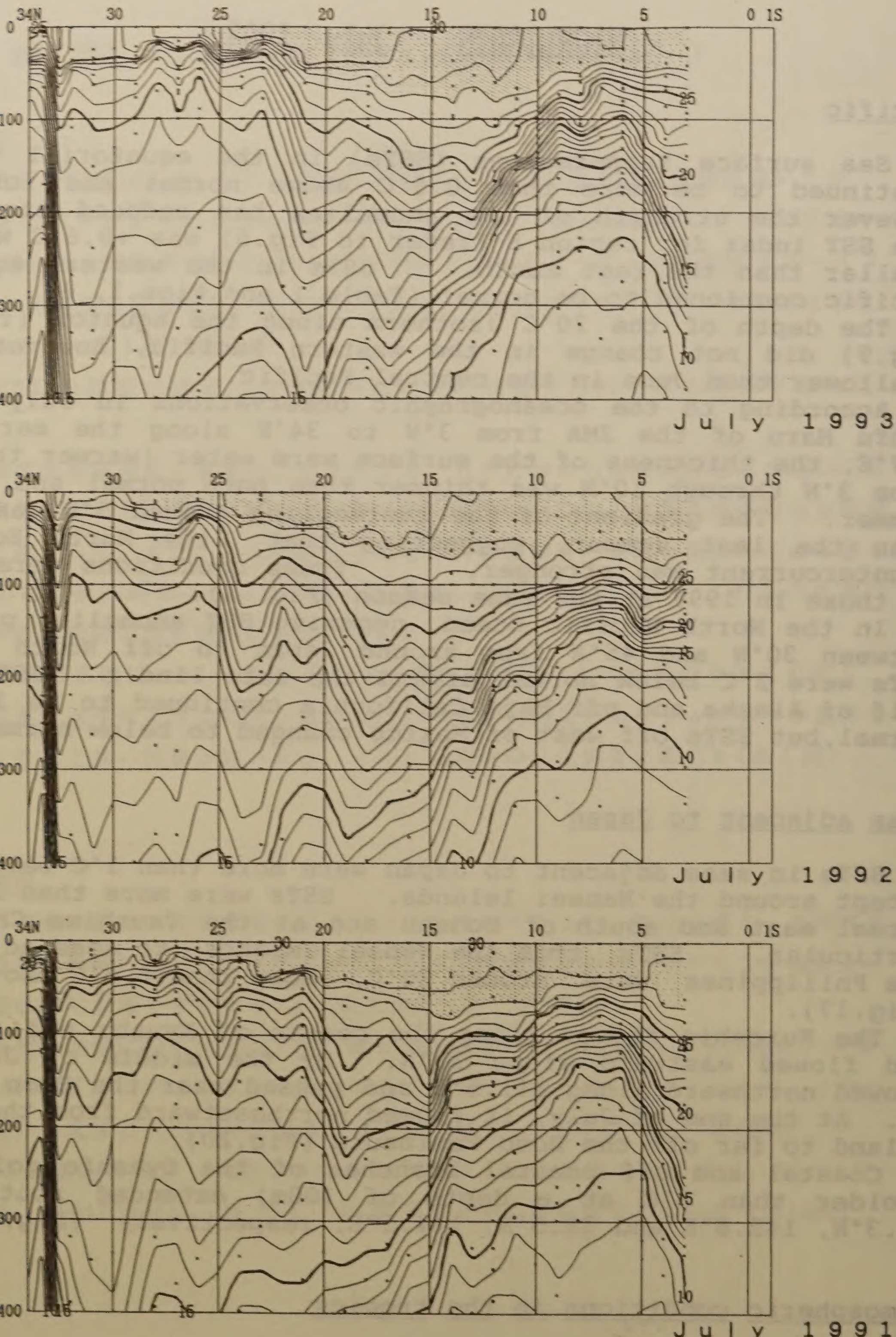


図 A 137°Eに沿う表層水温断面図（上：1993年7月、中：1992年7月、下：1991年7月）

Fig.A Depth-latitude section of ocean temperature along 137°E for July 1993(top), July 1992(middle) and July 1991(bottom). The contour interval is 1℃. Waters warmer than 28℃ are stippled.

Date	1992										1993						
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
Pacific Sea Surface Temperature (℃)																		
D (14N~ Eq.) (130E~150E)	28.0 -0.3	27.9 -0.5	28.7 -0.1	29.1 0.0	29.4 +0.1	29.1 -0.1	29.1 0.0	29.2 0.0	29.5 +0.2	29.0 -0.2	28.7 -0.2	28.0 -0.5	28.0 -0.3	28.2 -0.2	28.6 -0.2	28.8 -0.3	29.2 -0.1	29.1 -0.1
A (4N~ 4S) (160E~150W)	29.0 +1.0	28.9 +0.8	29.2 +1.0	29.4 +0.9	29.2 +0.7	29.2 +0.7	29.1 +0.7	28.8 +0.5	28.8 +0.4	28.7 +0.3	28.8 +0.6	28.5 +0.5	28.4 +0.4	28.4 +0.3	28.7 +0.5	29.0 +0.5	29.1 +0.6	29.1 +0.6
B (4N~ 4S) (150W~ 90W)	27.6 +1.4	28.0 +1.1	28.5 +1.4	28.3 +1.7	26.9 +0.8	25.6 +0.4	24.6 0.0	24.5 -0.1	24.6 0.0	24.7 +0.1	25.0 +0.1	25.5 +0.1	26.6 +0.4	27.4 +0.5	28.1 +1.0	28.0 +1.4	27.0 +0.9	25.8 +0.6
C (Eq.~ 10S) (90W~ 80W)	26.8 +1.1	27.5 +1.6	28.0 +2.9	26.4 +2.5	23.7 +1.0	21.6 0.0	20.5 -0.1	20.2 -0.1	20.8 +0.1	21.2 -0.3	22.5 -0.1	24.3 0.0	26.1 +0.4	27.0 +1.1	26.4 +1.3	25.2 +1.3	23.3 +0.6	22.1 +0.5
Pacific Sea Level Anomaly (cm)																		
YAP (10N,138E)	-2	2	1	6	5	-2	-3	2	9	6	8	7	9	11	1	-2	-2	
RABAUL (4S,152E)	-18	-18	-18	-20	-18	-13	-11	-10	-6	-6	-6	-9	-10	-14	-12	-13	-11	
MAJURO (7N,171E)	-9	-7	0	-2	4	7	7	11	15	6	4	-1	-4	-4	-8	-1	6	
TARAWA (1N,173E)	-3	-4	-7	-2	-2	2	3	5	2	2	4	1	7	10	3	5	6	
CHRISTMAS (2N,157W)	15	15	7	5	-3	-2	-7	-4	-3	4	1	5	4	8	6	5	-1	
SANTA CRUZ (1S, 90W)	20	18	8	4	-4	-1	-1	-3	-1	-1	-2	4	8	7	7	10	4	

第１表 (a) エルニーニョ監視指数

Table 1(a) El Niño monitoring indices. Data sources are the El Niño Monitoring Center, JMA for the sea surface temperature and the SOC of ISLP-PAC, Dept. of Oceanography, University of Hawaii for the sea level anomaly.

Date	1992											1993						
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
Southern Oscillation Index (Unit of pressure anomalies at Tahiti and Darwin : hPa)																		
SOI (TAHITI-DARWIN)	-0.8	-2.0	-1.6	-0.1	-1.3	-0.5	0.1	-0.0	-2.0	-0.6	-0.5	-0.8	-0.6	-0.5	-1.9	-0.8	-1.6	-1.0
TAHITI (17.5S , 150W)	-0.9	-1.5	-0.8	0.0	-1.6	0.7	0.1	-0.8	-2.3	-0.5	-1.1	-1.4	-1.9	1.0	-0.7	0.2	-0.6	-1.1
DARWIN (12.5S , 131E)	1.0	2.8	1.4	0.1	-0.1	1.6	-0.1	-0.8	0.5	0.6	-0.2	0.4	-0.3	2.4	1.9	1.4	1.3	0.4
High Cloud Amount Index																		
HCLD-PH (20N ~ 10N) (110E ~ 140E)	-1.2	-1.1	-1.0	-1.5	-1.1	-0.3	0.2	-1.6	0.9	-1.7	-1.4	-1.0	-0.3	-0.4	-0.5	-2.2	-1.9	-0.5
HCLD-MC (5N ~ 5S) (110E ~ 135E)	-1.4	-1.4	-1.0	-1.0	-0.7	-0.5	-1.2	-0.4	0.6	-0.8	0.4	-1.1	-0.9	-1.1	0.3	-1.4	-2.1	-1.0
HCLD-DL (5N ~ 5S) (170E ~ 170W)	1.0	1.8	2.3	2.0	1.7	0.0	0.1	-0.6	-0.1	1.3	1.2	0.8	1.4	0.5	2.8	2.0	1.8	1.3
Equatorial Zonal Wind Index																		
U200-IN (5N ~ 5S) (80E ~ 100E)	-1.3	0.5	0.1	0.6	0.2	-0.4	-0.4	-1.1	-1.4	0.1	0.1	-0.1	0.8	-0.9	-0.3	0.5	0.4	-0.3
U200-CP (5N ~ 5S) (180 ~ 125W)	-0.8	-0.8	-0.9	-1.1	-0.1	0.0	1.1	-0.4	0.7	-0.2	0.7	-0.3	-0.3	0.0	-0.6	-1.3	-0.0	1.1
U850-WP (5N ~ 5S) (160E ~ 175W)	0.6	1.0	0.9	0.6	0.1	0.1	-0.4	0.2	0.2	0.4	0.8	0.3	0.9	0.3	0.8	0.5	0.3	0.1
U850-CP (5N ~ 5S) (170W ~ 135W)	0.8	1.1	0.8	0.9	0.1	0.3	-0.7	0.5	-0.4	0.9	0.2	0.2	0.0	-0.1	0.3	0.6	0.6	-0.8
U850-EP (5N ~ 5S) (130W ~ 100W)	0.0	0.3	0.2	0.5	0.4	-0.1	-0.9	0.6	-1.2	1.9	-0.0	0.1	-0.1	0.2	0.5	0.9	0.7	-0.4

第１表 (b) エルニーニョ監視指数(続き)

Table 1(b) El Niño monitoring indices (continued) .

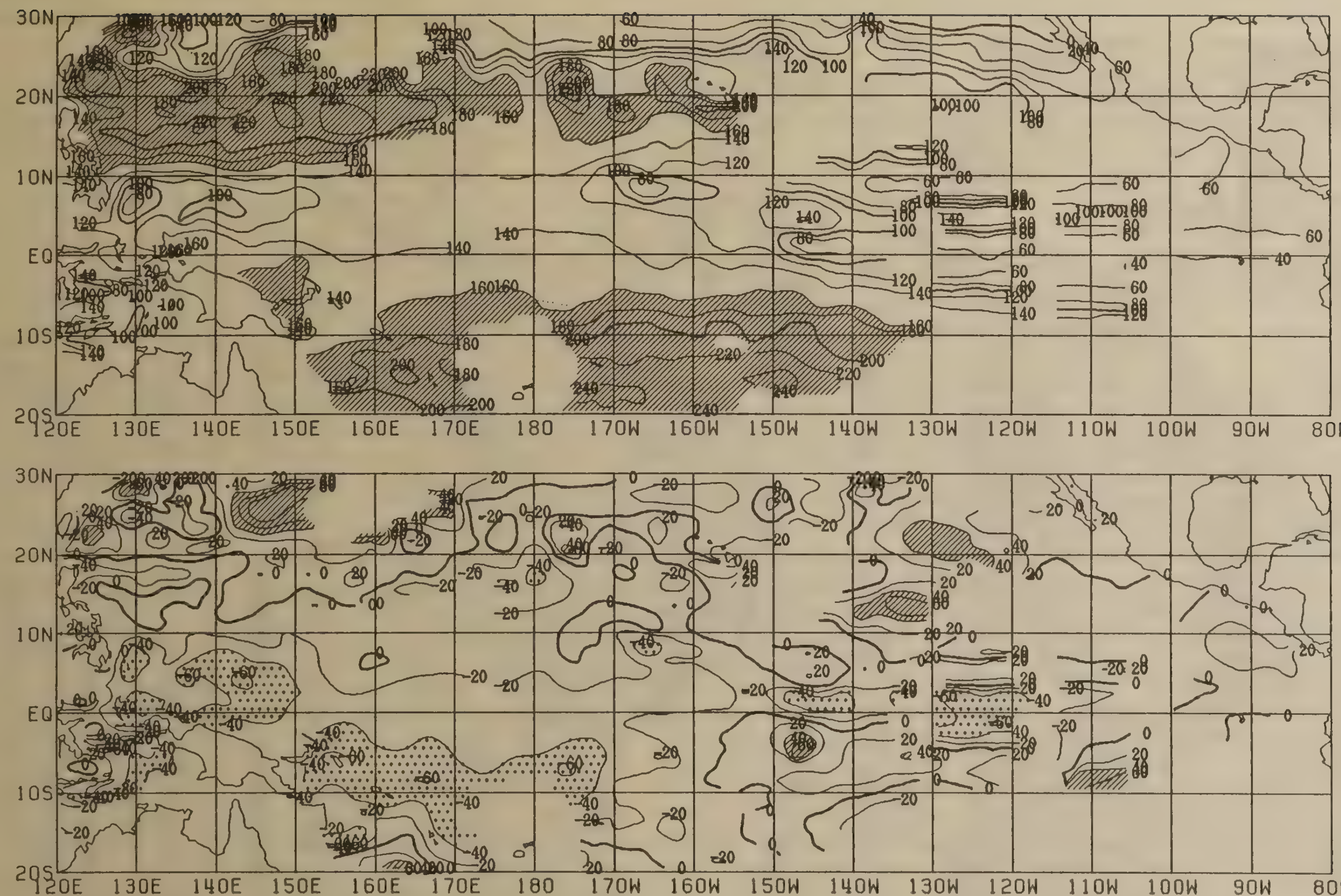
Data source for these atmospheric conditions is the Long-range Forecast Division, JMA.

SST & Anomalies in the Global Ocean



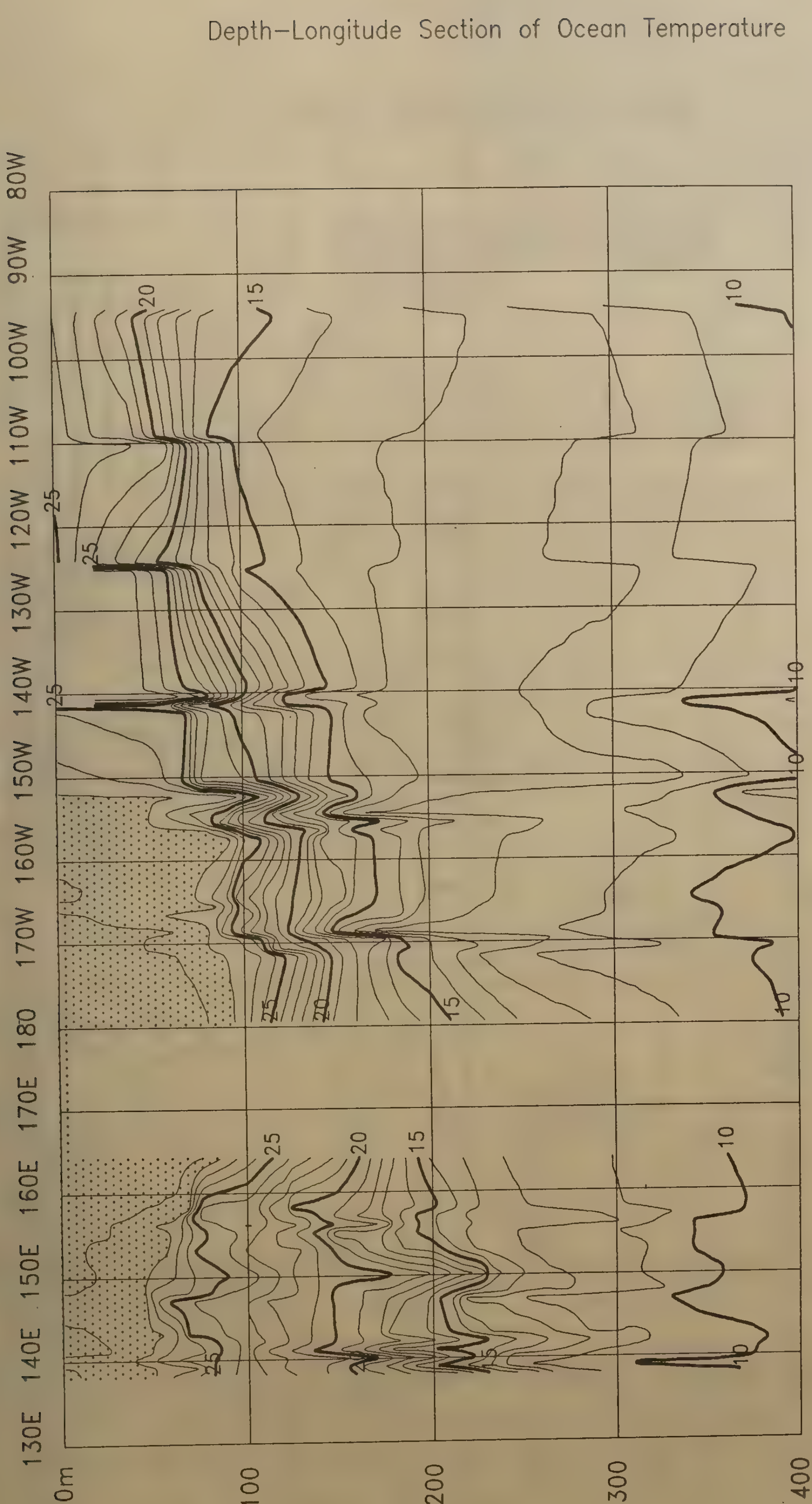
第１図　全球月平均海面水温図（上）及び偏差図（下）（1993年 7月）

Fig.1　Monthly mean sea surface temperature in the global ocean (top) and anomalies (bottom) for JUL 1993.　Anomalies are computed with respect to the JMA climatology (1961–90) (Climatic charts of sea surface temperatures of the western North Pacific and the global ocean, March 1991).　The Contour interval is 1° C and additional anomaly contours of ±0.5° C are shown as broken lines.　Negative anomalies are stippled.



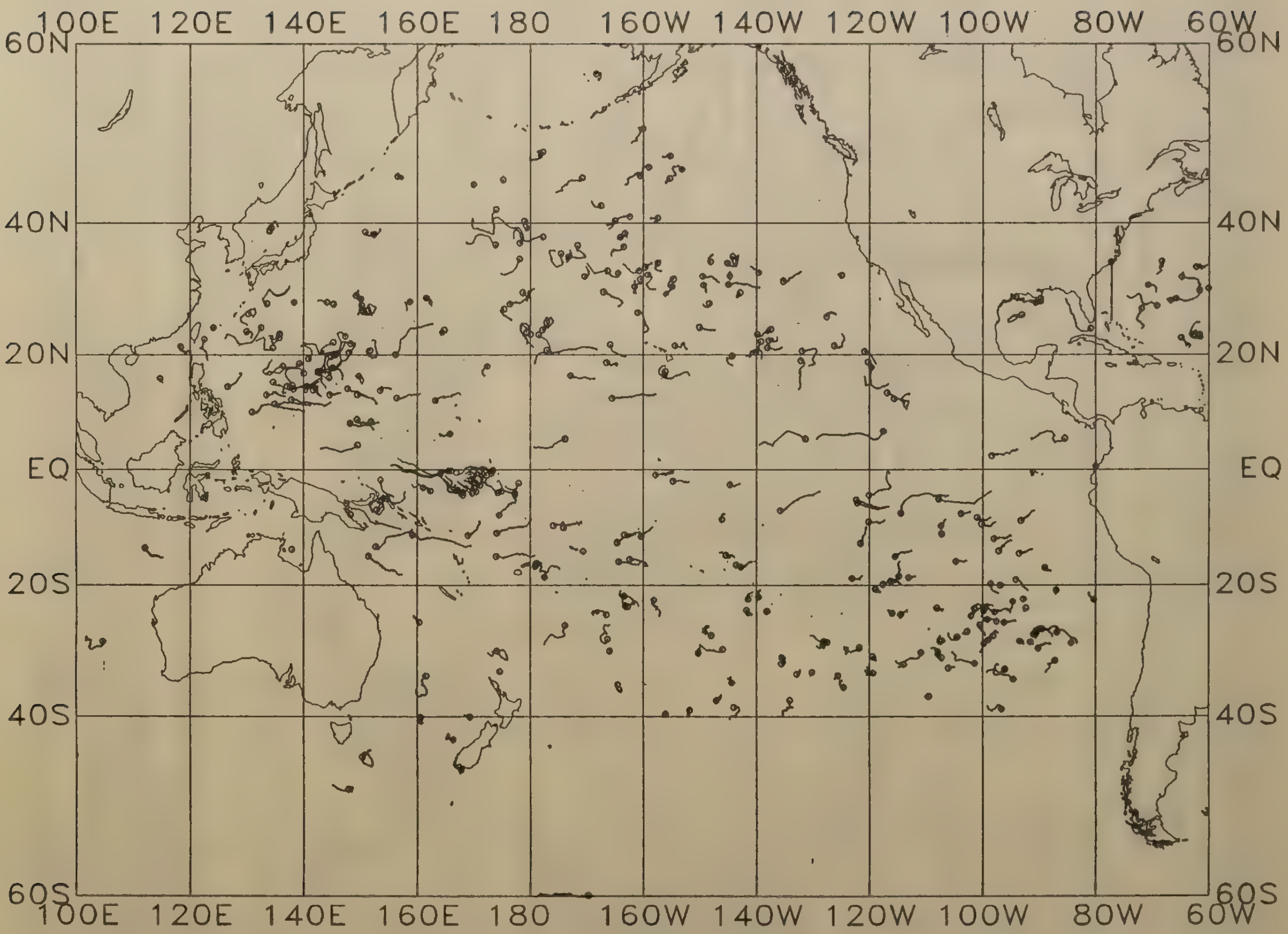
第２図　太平洋表層水温（20℃深度）図（上）及び偏差図（下）（1993年 7月）

Fig.2 The depth of a 20° C isotherm in the Pacific Ocean (top) and anomalies (bottom) for JUL 1993. Anomalies are computed with respect to the climatology (Levitus, 1982, Climatological Atlas of the World Ocean, NOAA).
The contour interval is 20m with shading for values greater than 160m (top), and shading/stippling for values greater/smaller than +40m/−40m (bottom).



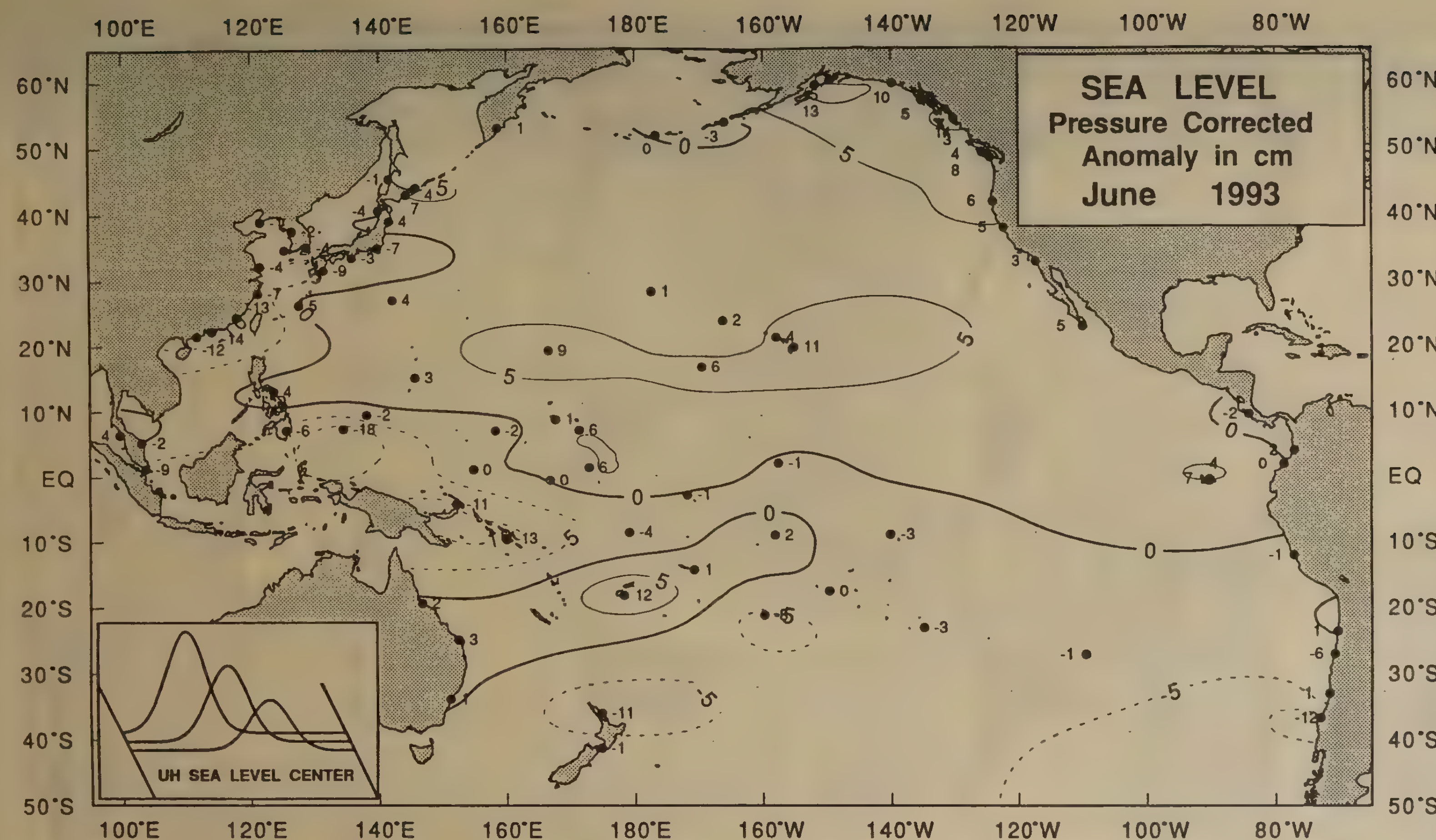
第３図　太平洋赤道に沿う表層水温断面図（1993年 7月）

Fig.3 Depth–longitude section of the Pacific Ocean temperature along the equator for JUL 1993. The contour interval is 1° C with spotted shading for values greater than 28° C.



第4図　太平洋ブイ流跡図(1993年 7月)

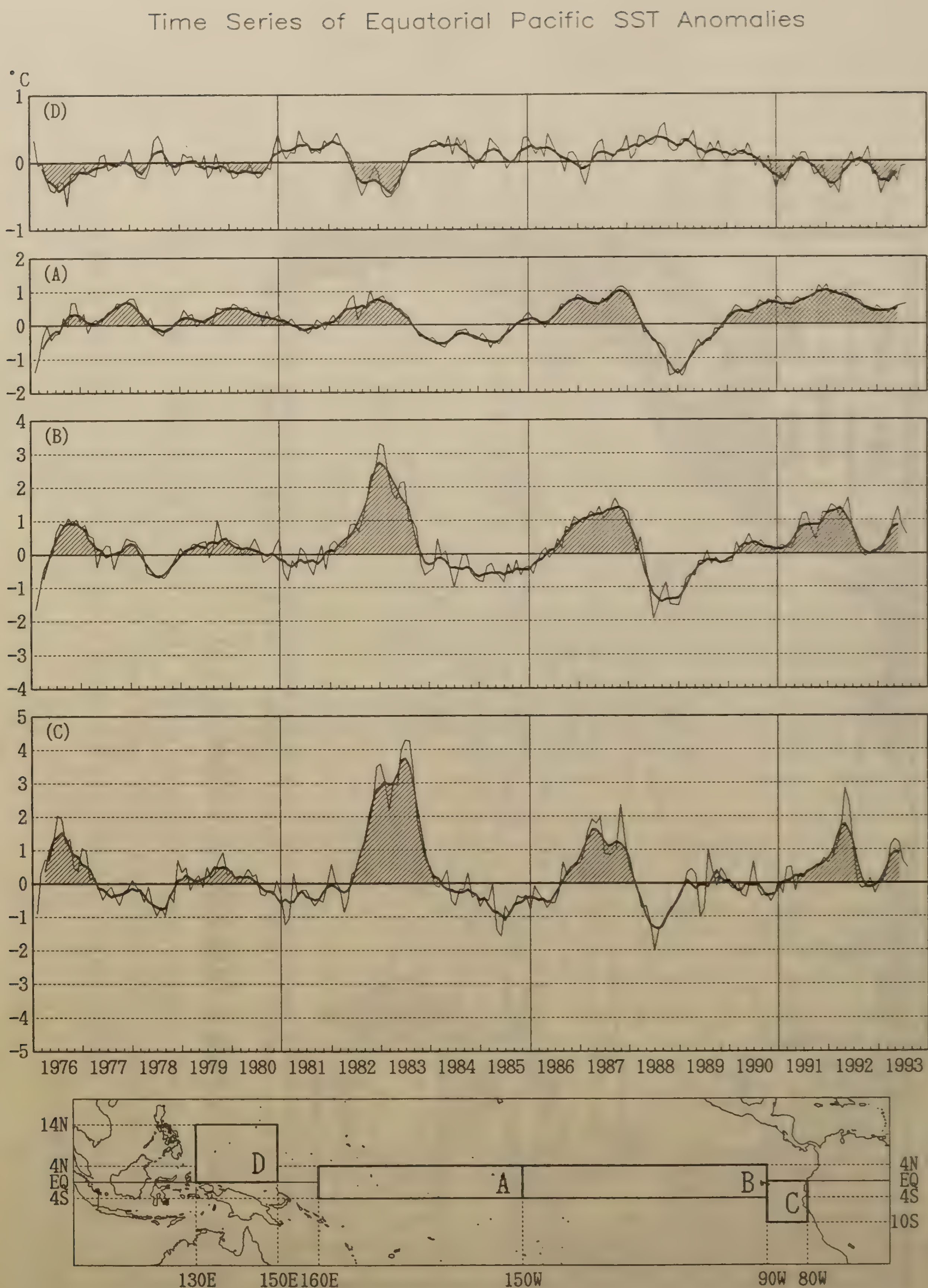
Fig.4 Movements of drifting buoys in the Pacific Ocean during JUL 1993. Each track is one buoy, with the small circle representing the buoy's last position for the month.



第5図　太平洋海面水位偏差図（ 1993年 6月 ）

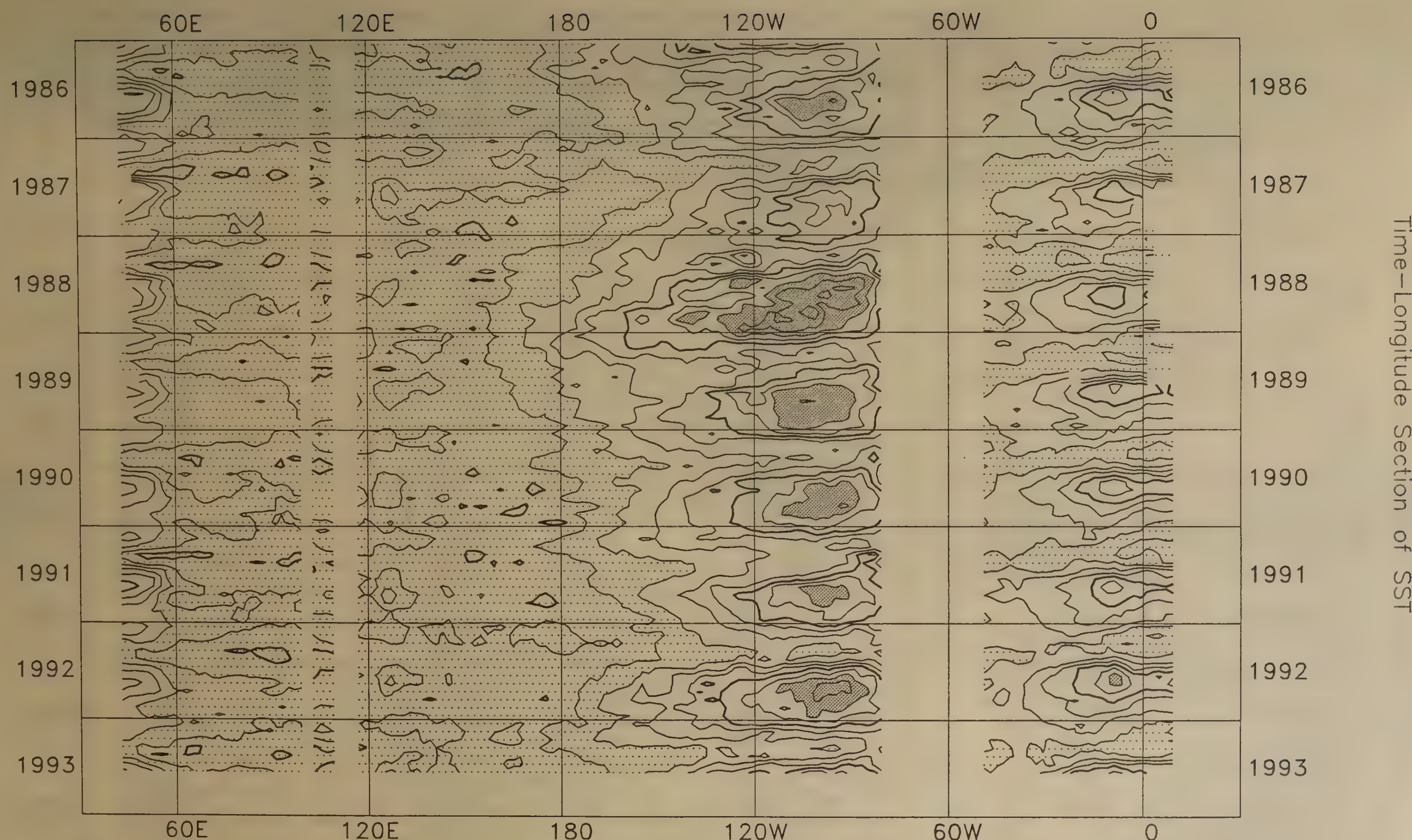
Fig.5　Sea level anomalies obtained from the 1975 to 1986 mean JUN sea level adjusted for atmospheric pressure (JUN 1993).

This figure is prepared by the SOC of ISLP–PAC, Dept. of Oceanography, Univ. of Hawaii.



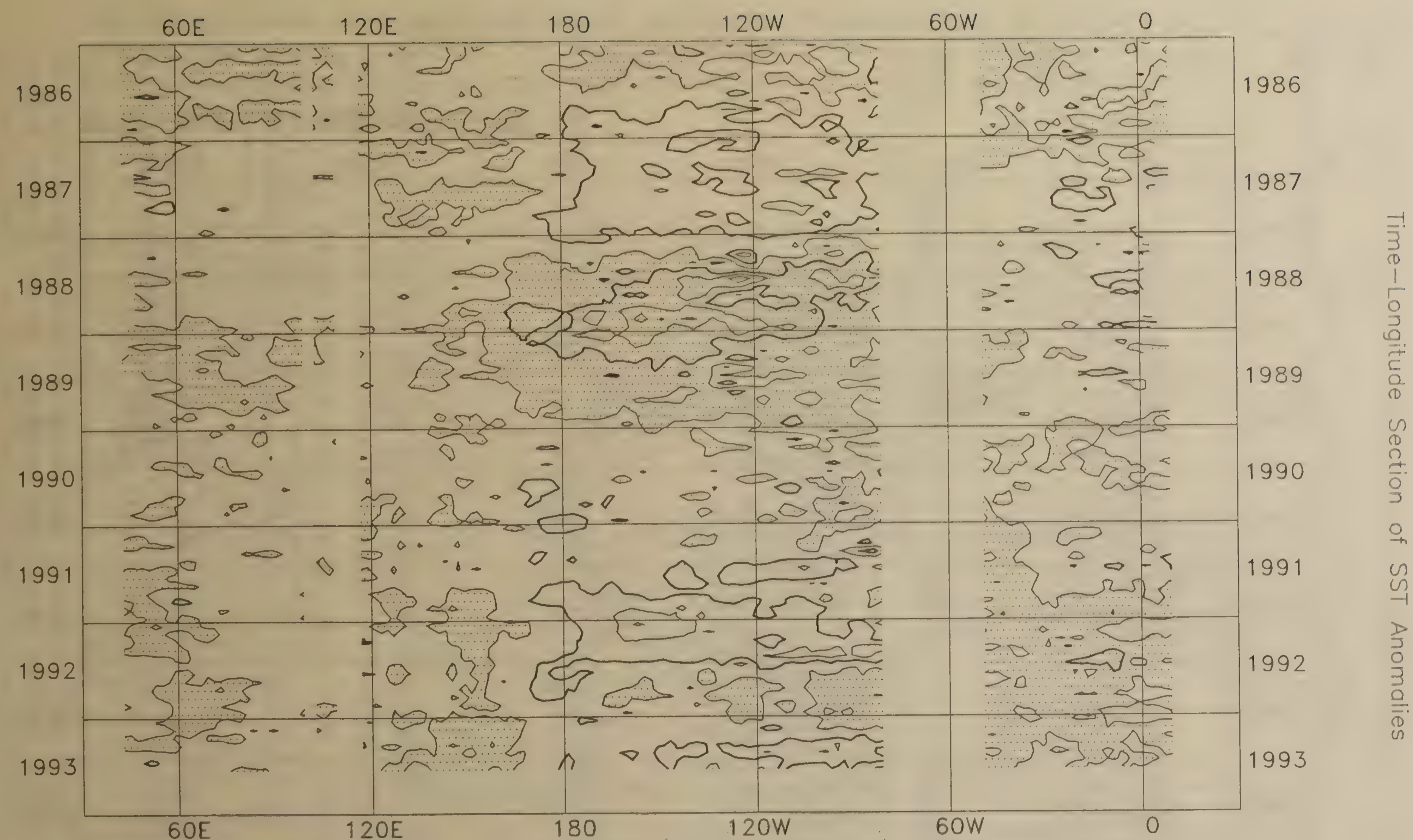
第６図　赤道太平洋海面水温偏差時系列図

Fig.6 Time series of monthly mean SST anomalies in the equotorial Pacific Ocean for the areas indicated at the bottom of the figure. Thin lines show the monthly values and thick lines their 5 month running mean. Positve anomalies (A,B,C) and negative anomalies (D) are shaded. Anomalies are computed with respect to the JMA climatology (1961–90).



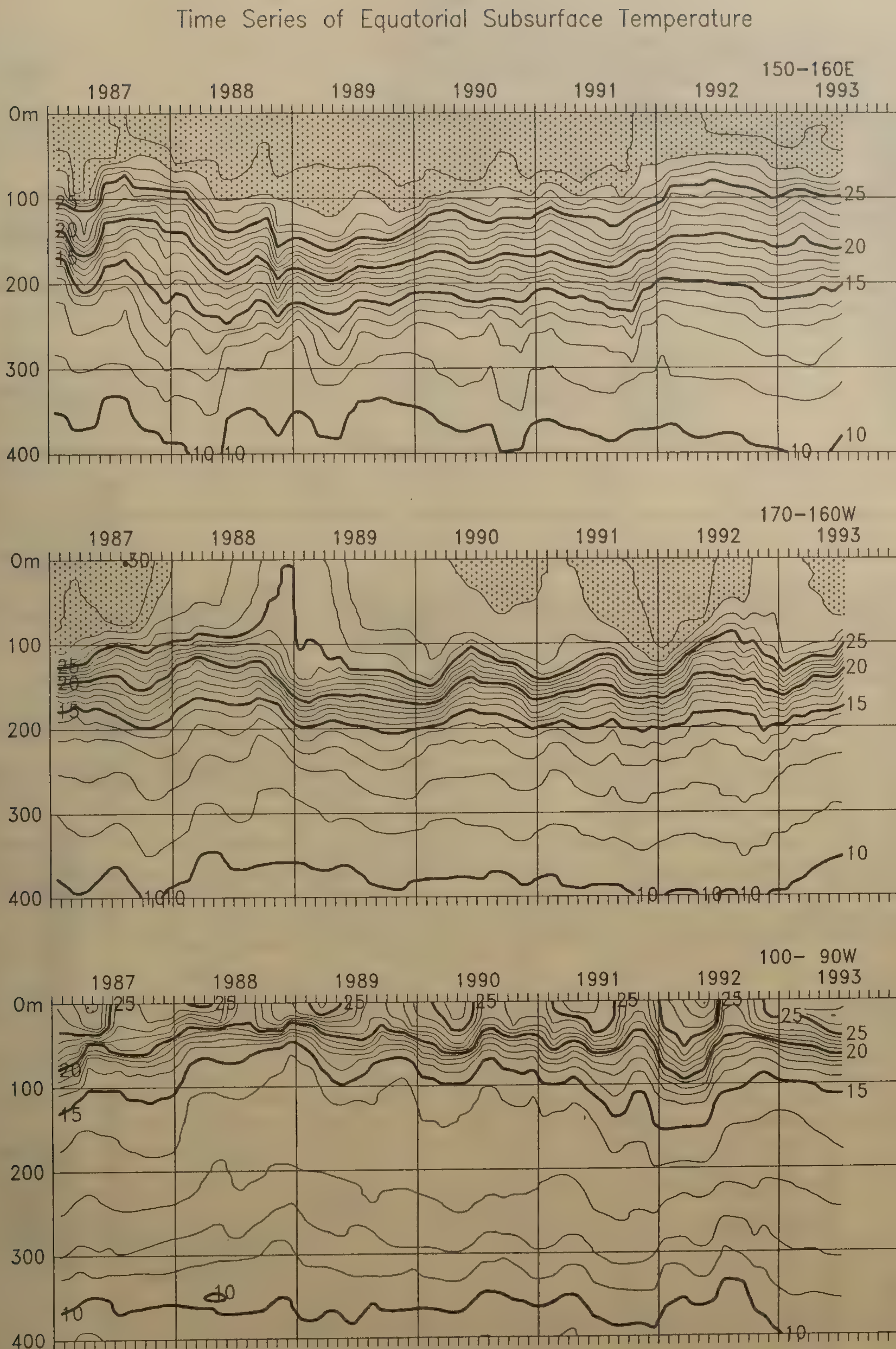
第7図　赤道に沿う海面水温時系列図

Fig.7 Time–longitude section of SSTs along the equator (2° N–2° S) in the global ocean. The contour interval is 1° C, with thick contour lines at 25 and 30° C. SST values greater than 28° C are spotted and values less than 23° C are shaded.



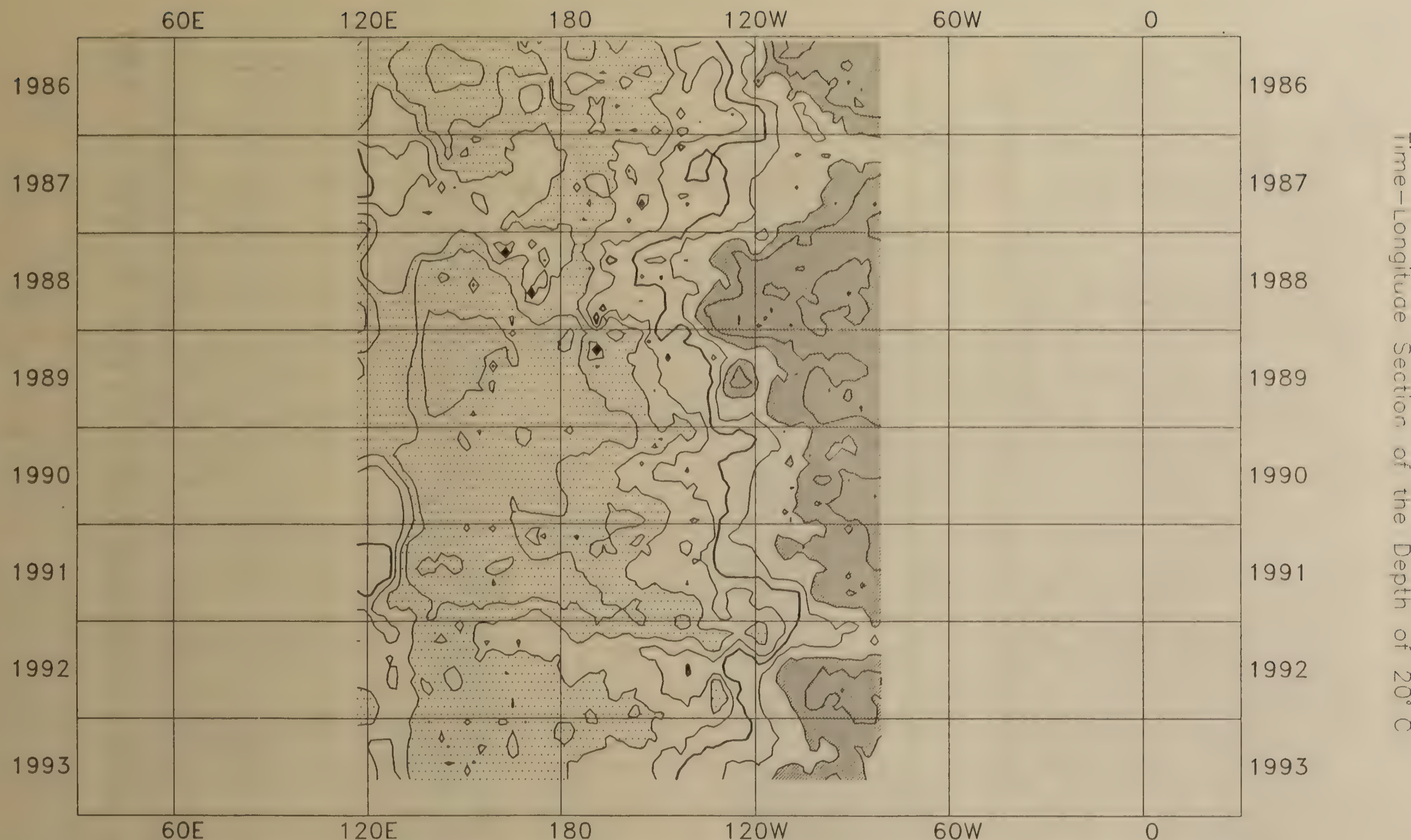
第8図　赤道に沿う海面水温偏差時系列図

Fig.8 Time–longitude section of SST anomalies along the equator (2° N–2° S) based on the JMA climatology (1961–1990). The contour interval is 1° C, with thick contour lines at +1° C and –1° C. Negative anomalies are spotted.



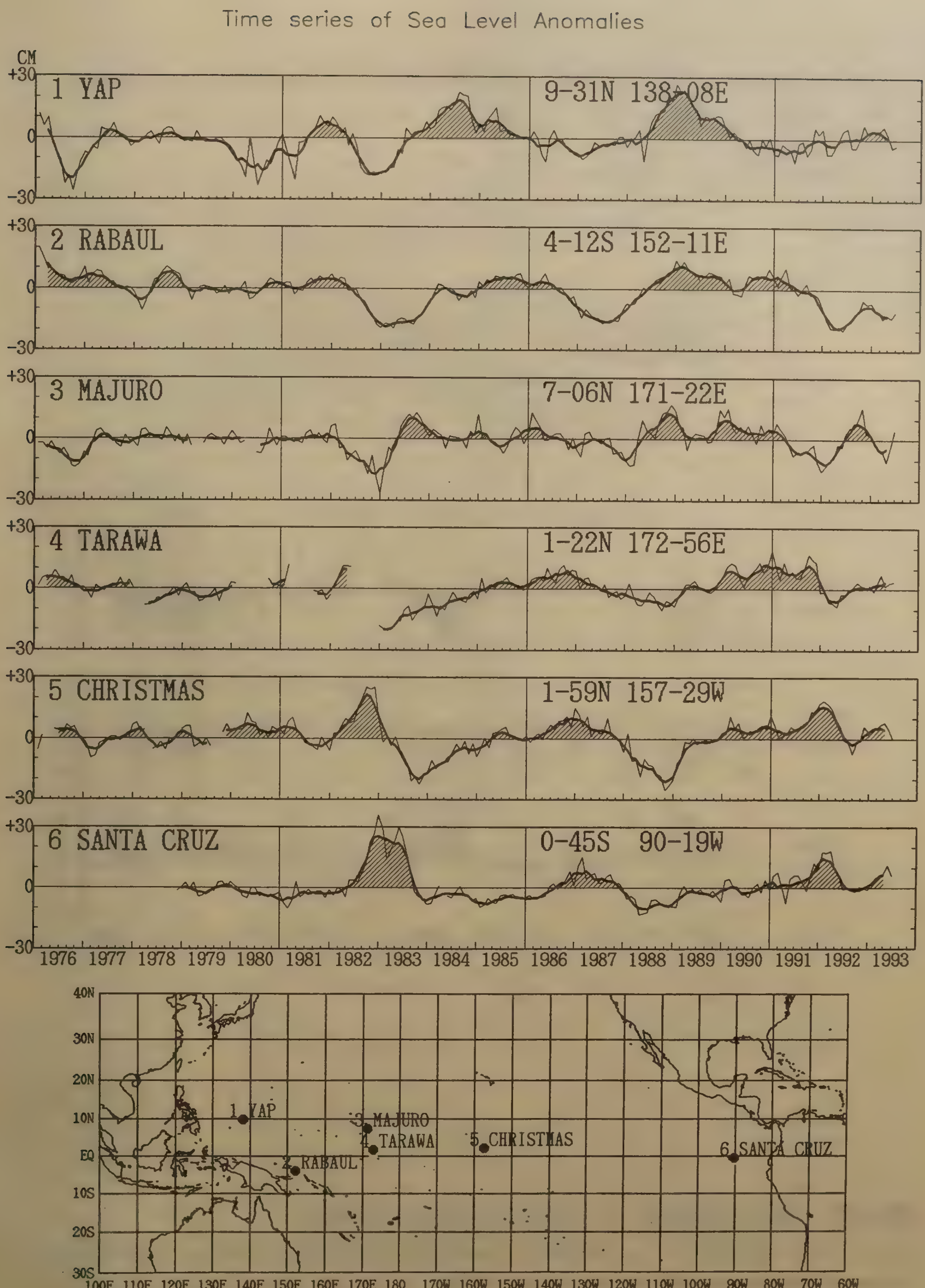
第９図　赤道太平洋表層水温時系列図（上：西部、中：中部、下：東部）

Fig.9 Time series of equatorial (2° N–2° S) subsurface temperature for the western Pacific (top, 150–160° E), the central Pacific (middle, 170–160° W) and the eastern Pacific (bottom, 100–90° W). The contour interval is 1° C with spotted shading for the values greater than 28° C.



第10図　太平洋の赤道に沿う20℃深度時系列図

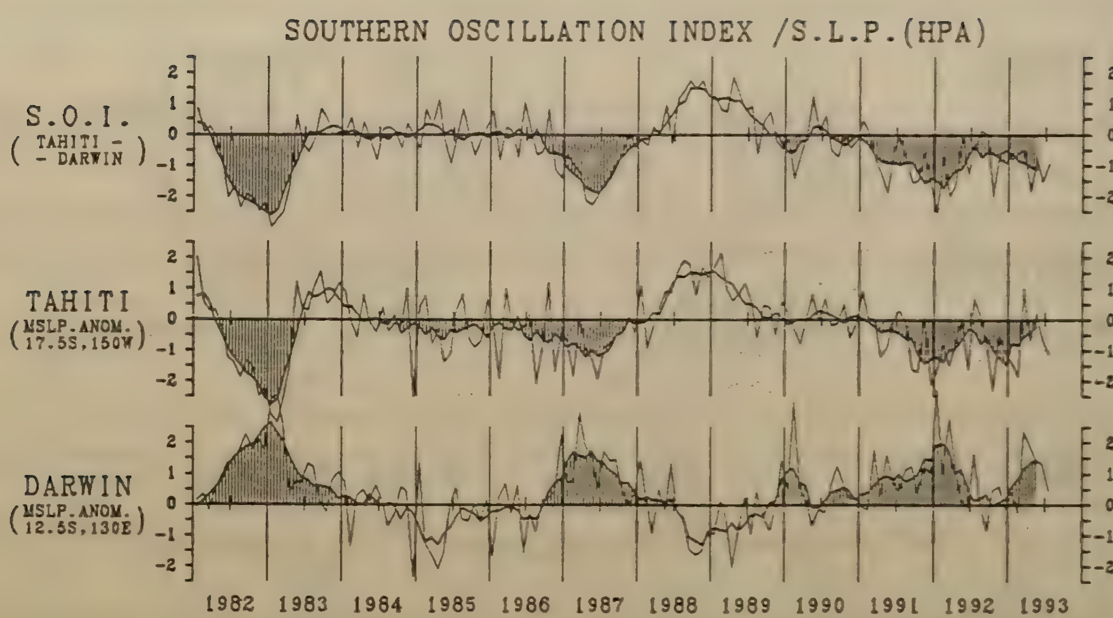
Fig.10 Time−longitude section of the depth of a 20° C isotherm along the equator in the Pacific Ocean. The contour interval is 20m with thick contour lines at 100m. Values shallower than 60m are shaded and those deeper than 140m are stippled.



第11図　太平洋月平均海面水位偏差時系列図

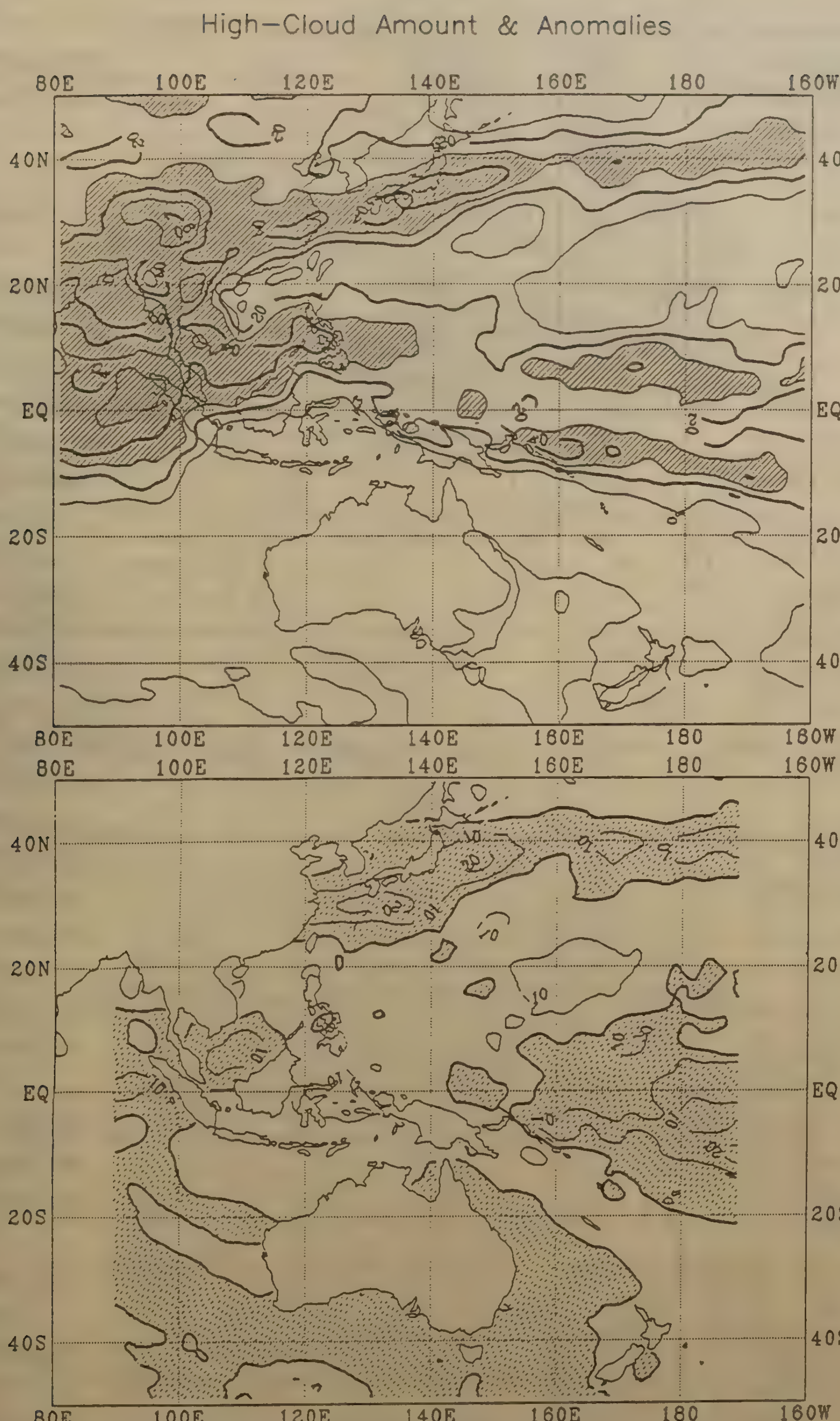
Fig.11 Time series of sea level anomalies based on 1976 to 1990 monthly mean sea level obtained from the stations indicated at the bottom of the figure. Thin lines show the monthly mean and thick lines show their 5 month running mean. Positive anomalies are shaded.

Time series of SOI & Sea Level Pressure Standardized Anomalies



第12図　南方振動指数及び海面気圧偏差時系列図

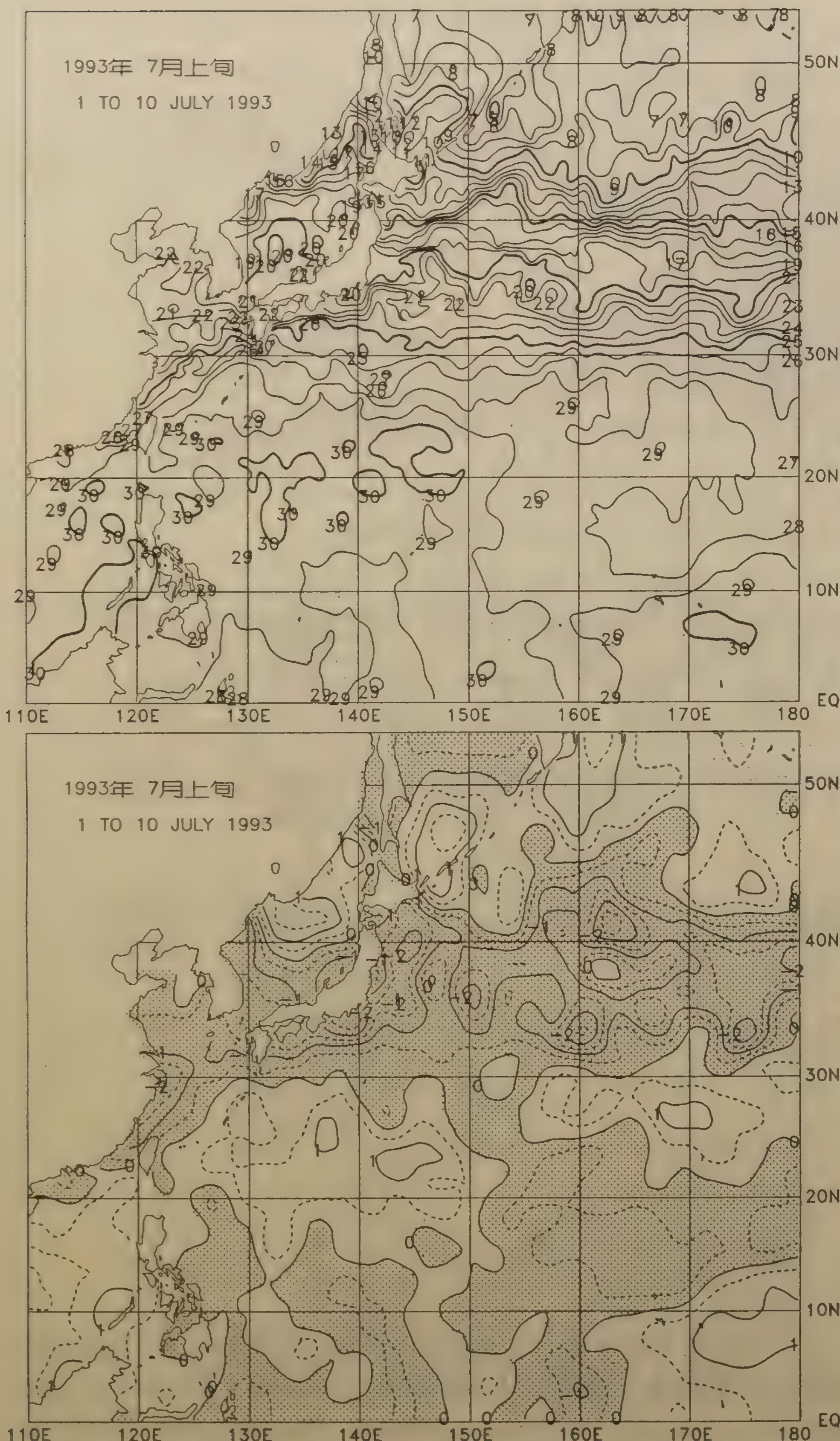
Fig.12 The Southern Oscillation Index (top) and monthly mean sea level pressure standardized anomalies at Tahiti (middle) and Darwin (bottom). Thin lines show the monthly mean and thick lines their 5 month running mean. Negative values (top, middle) and positive values (bottom) are shaded. Base periods for normals and standard deviations are 1961−1990. This figure is prepared by the Long−range Forecast Division, JMA.



第13図　月平均上層雲量分布図及び偏差図（1993年 7月）

Fig.13 Monthly mean of the high-cloud amount (%, top) and its anomalies (%, bottom) in the equatorial Pacific for JUL 1993. The contour interval is 10%. Areas above 30% are shaded (top) and positive anomalies are stippled (bottom). Anomalies represent a departure from the 1978–1990 base period monthly means. This figure is prepared by the Long-range Forecast Division, JMA.

Ten-day mean SST & Anomalies

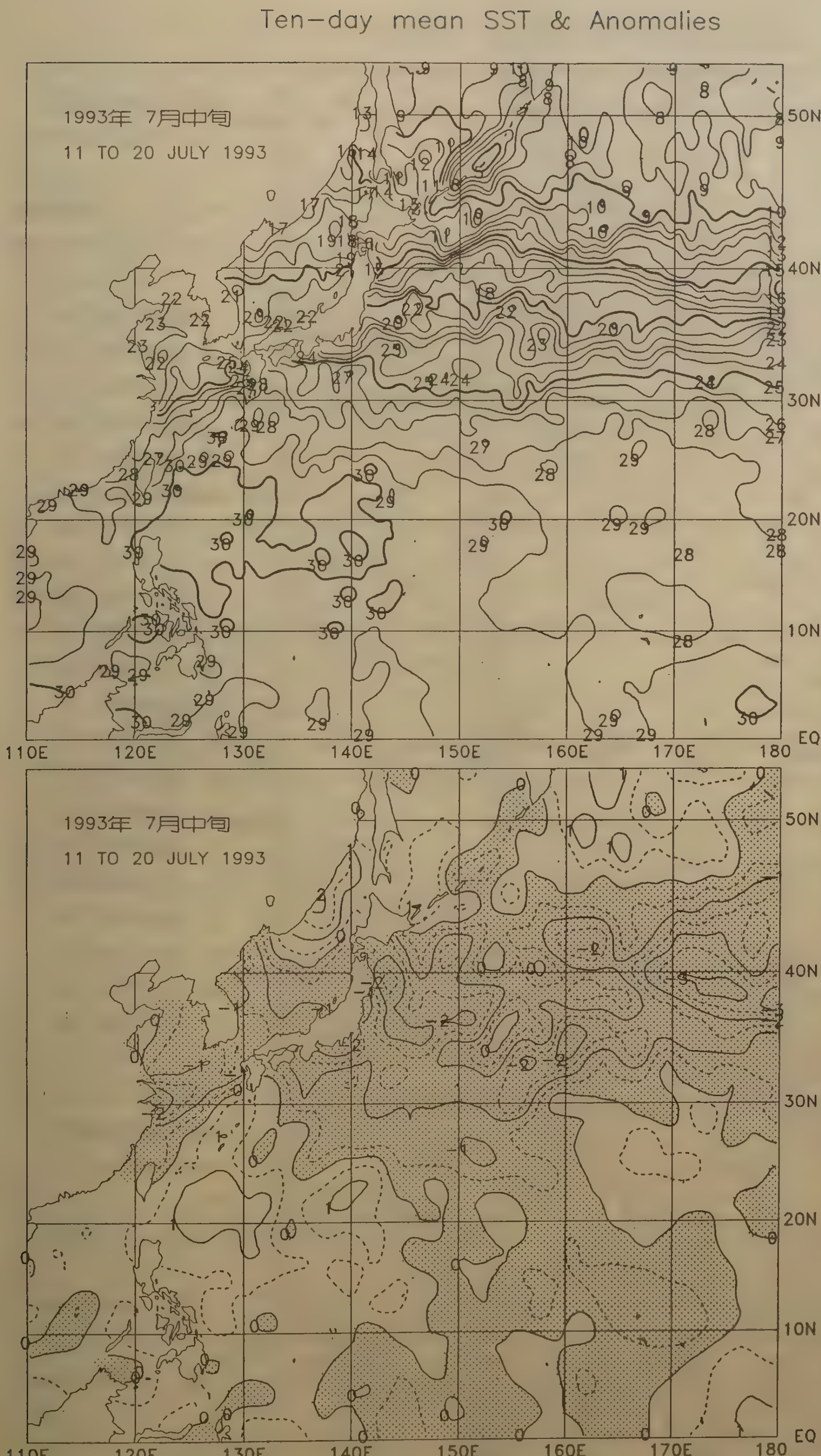


旬平均沿岸水温(℃) Coastal Water Temperature		
地名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	29.6	+0.7
那 覇(47936)	28.7	+1.4
名 瀬(47909)	28.5	-
足摺岬(47898)	22.1	−1.7
潮 岬(47778)	21.4	-
御前崎(47655)	20.5	−2.6
八丈島(47678)	22.1	−1.9
館 山(47672)	19.4	−2.0
小名浜(47598)	17.4	+0.1
宮 古(47585)	14.0	−0.2
浦 河(47426)	12.6	−0.4
紋 別(47435)	14.4	-
稚 内(47401)	16.0	-
寿 都(47421)	15.3	-
江 差(47428)	16.6	-
飛 島(47587)	19.5	−1.5
輪 島(47600)	20.7	−1.5
西 郷(47740)	20.6	-
浜 田(47755)	21.8	-
厳 原(47800)	20.5	-
牛 深(47838)	21.4	-

海洋気象ブイロボット 旬平均海面水温(℃) Ocean Data Buoy SST		
日本海	37.9N,145.4E	19.9
四国沖	29.0N,135.0E	27.6
東シナ海	28.2N,126.3E	27.7

第14図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 7月上旬)

Fig.14 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 1st ten-day period in JUL 1993. Anomalies are computed with respect to the JMA climatology (1961–90). The contour interval is 1°C and additional anomaly contours of 0.5°C are shown. Negative anomalies are stippled.



旬平均沿岸水温(℃)
Coastal Water Temperature

地名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	30.4	+1.2
那 覇(47936)	29.3	+1.9
名 瀬(47909)	29.9	-
足摺岬(47898)	23.3	−1.5
潮 岬(47778)	22.7	-
御前崎(47655)	21.2	−2.9
八丈島(47678)	24.0	−0.8
館 山(47672)	19.0	−2.6
小名浜(47598)	17.3	−0.7
宮 古(47585)	14.7	−0.4
浦 河(47426)	13.9	−0.6
紋 別(47435)	16.7	-
稚 内(47401)	17.2	-
寿 都(47421)	-	-
江 差(47428)	18.0	-
飛 島(47587)	20.3	−2.1
輪 島(47600)	22.1	−1.3
西 郷(47740)	21.2	-
浜 田(47755)	24.2	-
厳 原(47800)	21.5	-
牛 深(47838)	24.2	-

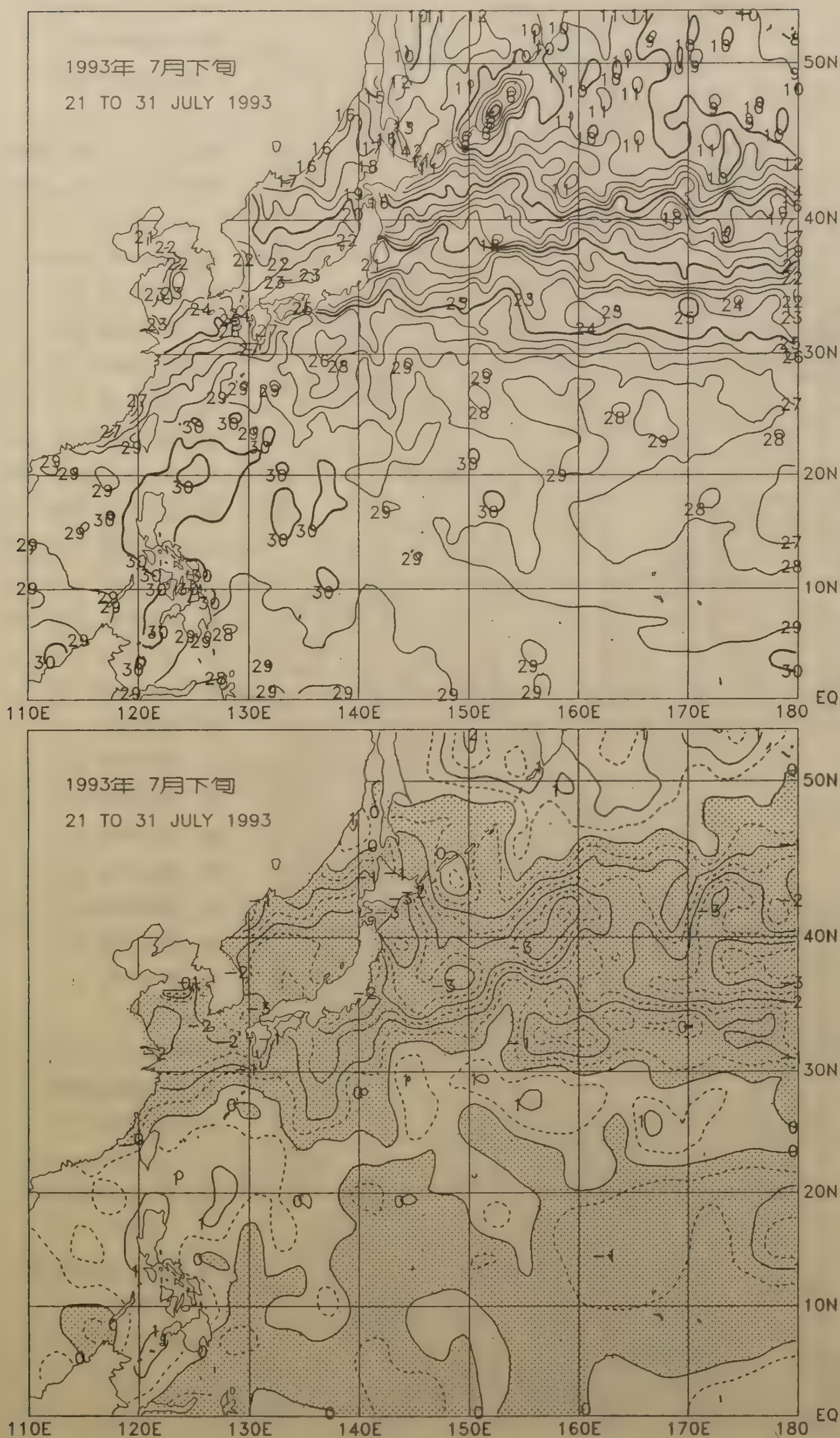
海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海 37.9N,145.4E	20.7
四国沖 29.0N,135.0E	28.1
東シナ海 28.2N,126.3E	28.6

第15図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 7月中旬)

Fig.15 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 2nd ten-day period in JUL 1993. Anomalies are computed with respect to the JMA climatology (1961–90). The contour interval is 1°C and additional anomaly contours of 0.5°C are shown. Negative anomalies are stippled.

Ten−day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

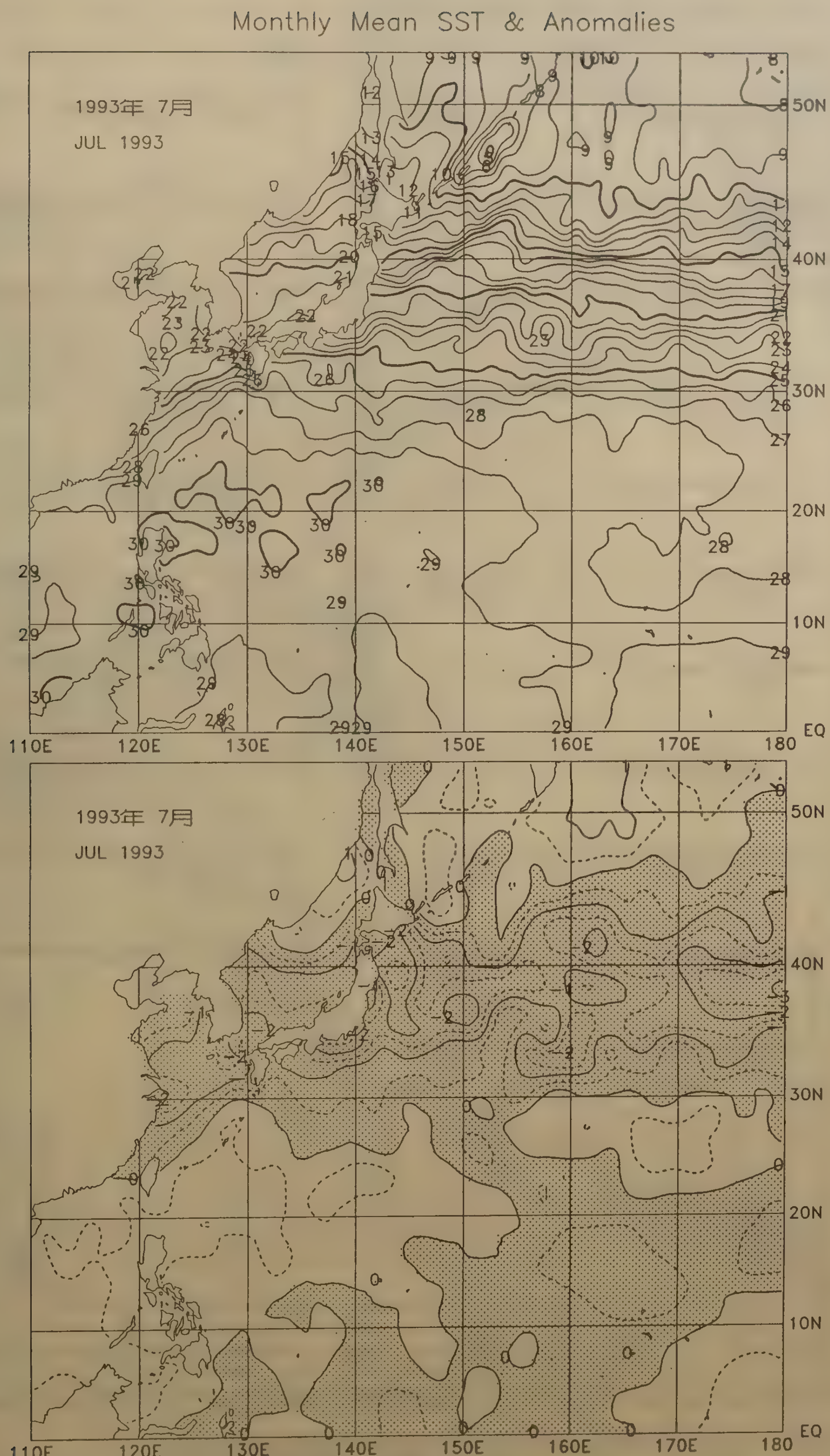
地 名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	30.3	+1.1
那 覇(47936)	28.7	+0.7
名 瀬(47909)	29.0	−
足摺岬(47898)	24.5	−1.6
潮 岬(47778)	24.5	−
御前崎(47655)	22.3	−3.1
八丈島(47678)	24.6	−1.2
館 山(47672)	20.8	−2.5
小名浜(47598)	18.7	−1.1
宮 古(47585)	15.4	−1.3
浦 河(47426)	14.2	−1.9
紋 別(47435)	16.5	−
稚 内(47401)	16.0	−
寿 都(47421)	17.2	−
江 差(47428)	17.9	−
飛 島(47587)	21.6	−3.0
輪 島(47600)	23.8	−1.9
西 郷(47740)	21.9	−
浜 田(47755)	22.7	−
厳 原(47800)	22.1	−
牛 深(47838)	24.4	−

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,145.4E	21.2
四国沖	29.0N,135.0E	27.2
東シナ海	28.2N,126.3E	29.0

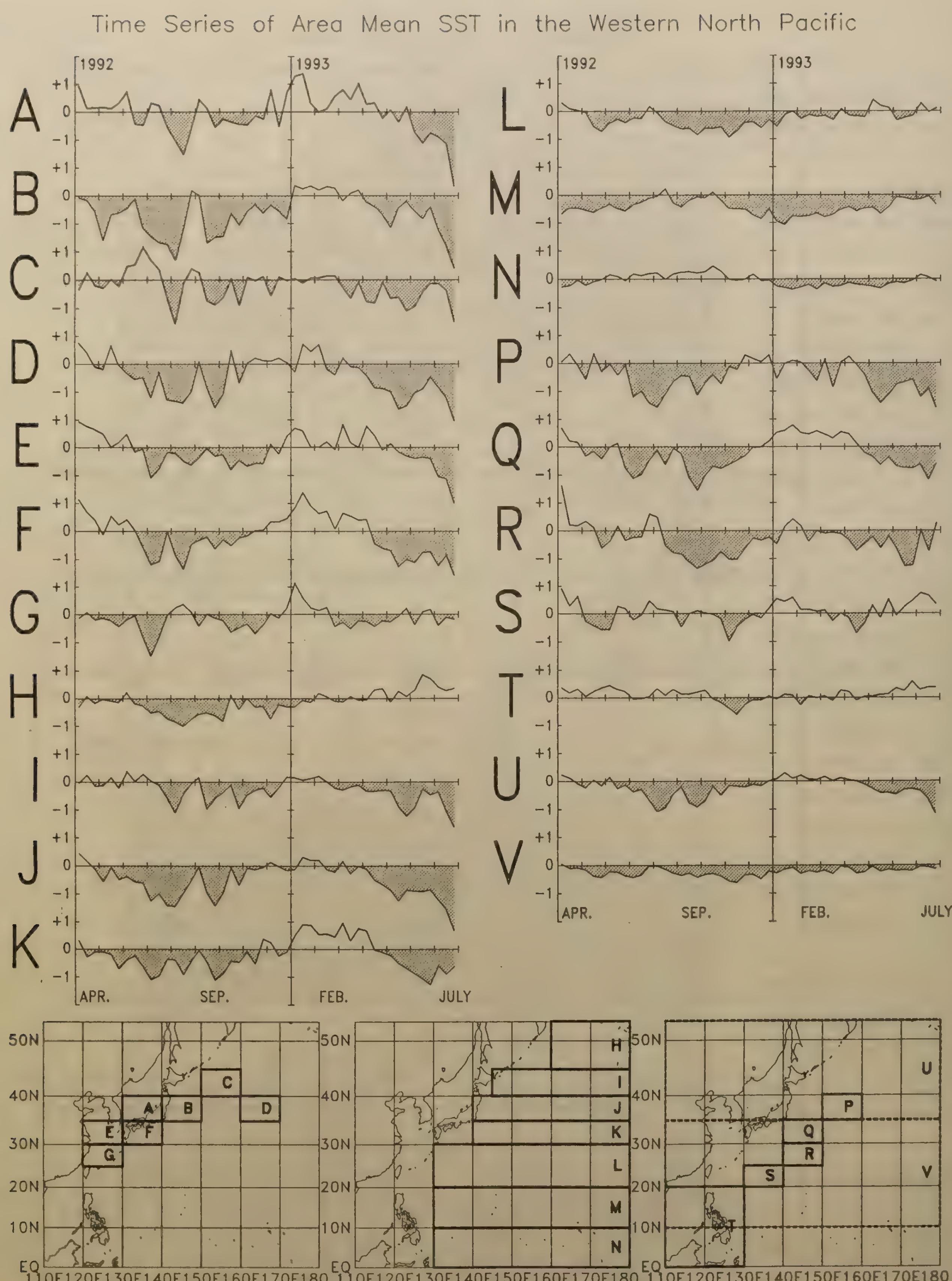
第16図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 7月下旬)

Fig.16 Ten−day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 3rd ten−day period in JUL 1993. Anomalies are computed with respect to the JMA climatology (1961−90). The contour interval is 1° C and additional anomaly contours of 0.5° C are shown. Negative anomalies are stippled.



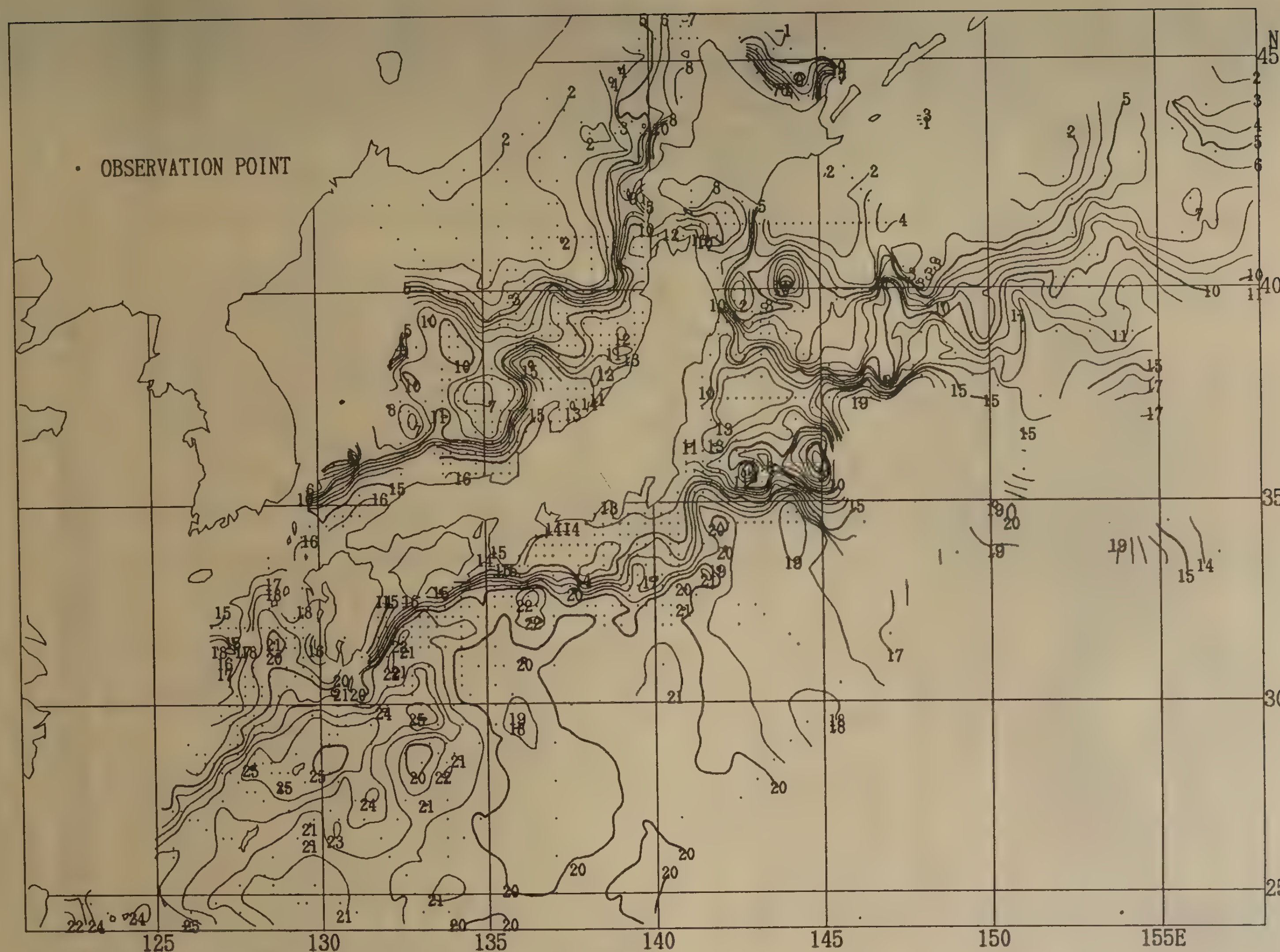
第17図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1993年 7月)

Fig.17 Monthly mean SSTs in the western North Pacific (top) and anomalies (bottom) for JUL 1993. Anomalies are computed with respect to the JMA climatology (1961–90). The contour interval is 1° C and additional anomaly contours of 0.5° C are shown. Negative anomalies are stippled.



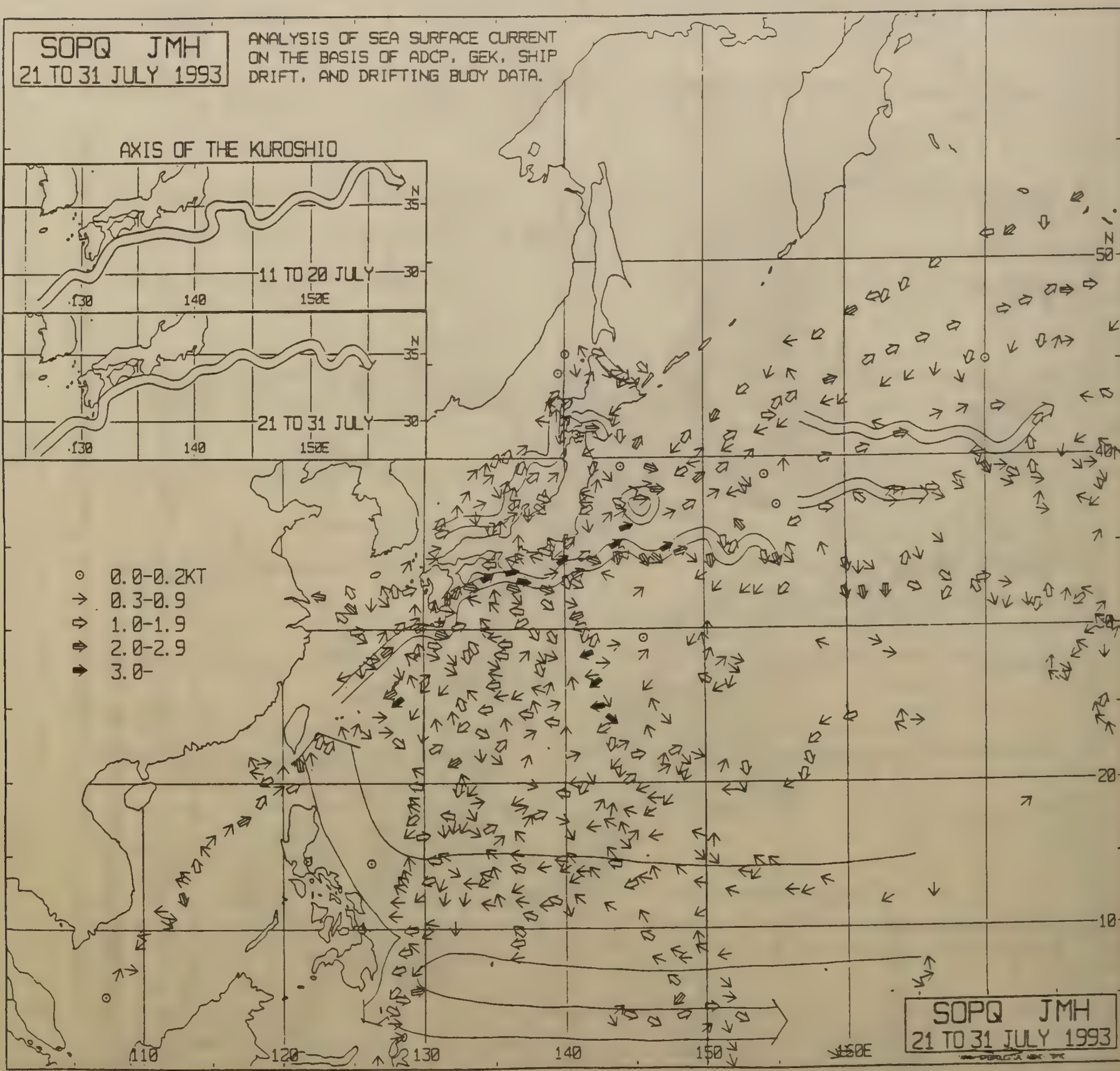
第18図　北西太平洋旬平均海面水温平年偏差時系列図

Fig.18 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas indicated at the bottom. Negative anomalies are shaded. Anomalies are computed with respect to the JMA climatology (1961–90).



第19図　日本近海表層水温（深さ100M）図（1993年 7月）

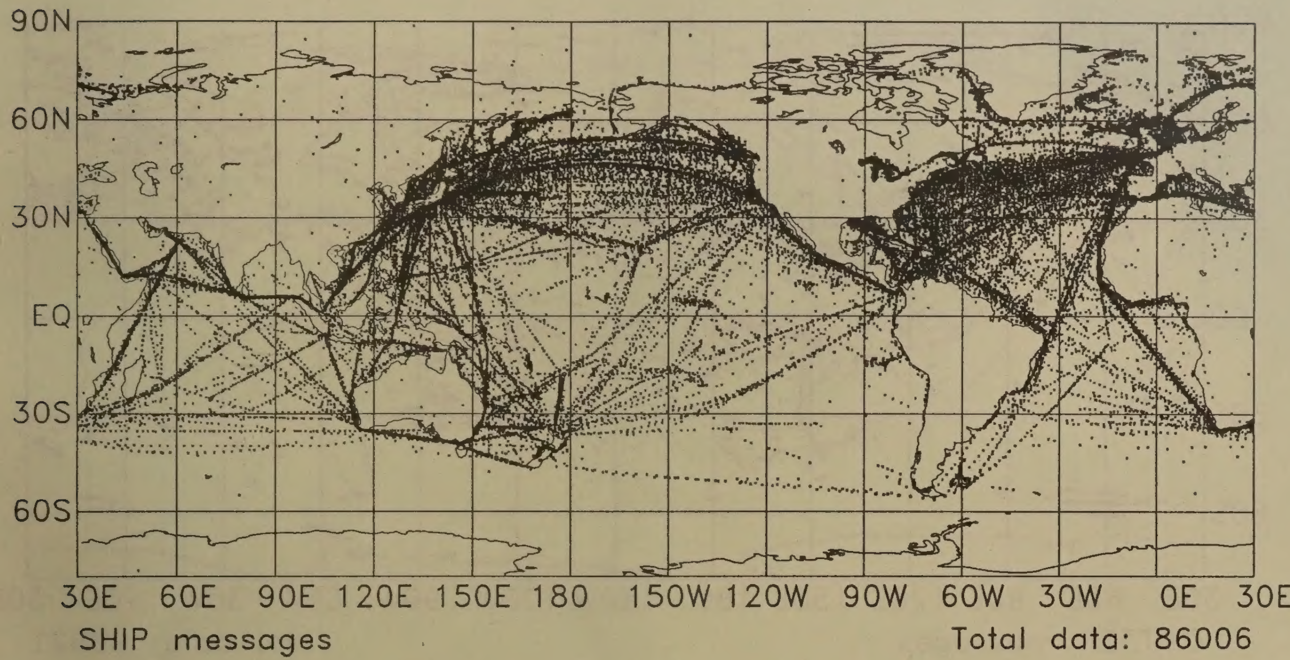
Fig.19　Subsurface (100m) temperatures in seas adjacent to Japan for JUL 1993.

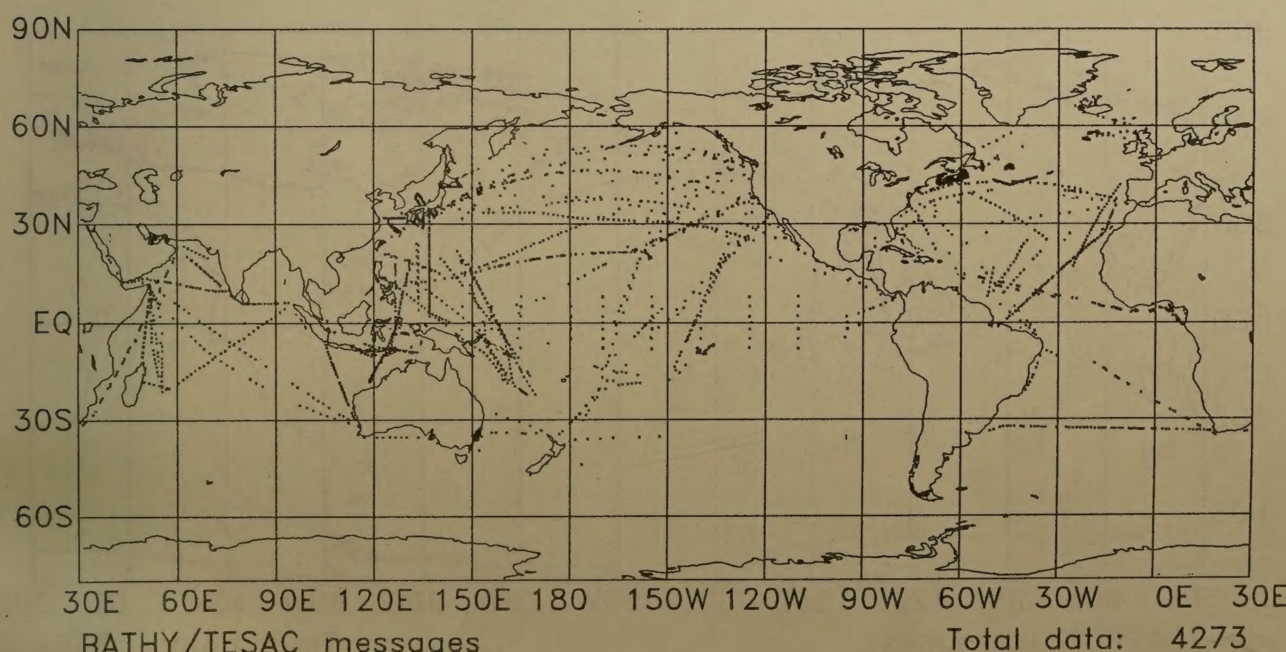


第20図　北西太平洋旬平均海流図（1993年 7月下旬）

Fig.20 Ten-day analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in JUL 1993. Small arrows indicate sea surface currents measured with acoustic Doppler current profilers, GEKs deployed in research vessels, and ship drift by merchant ships/drifting buoys during the month. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

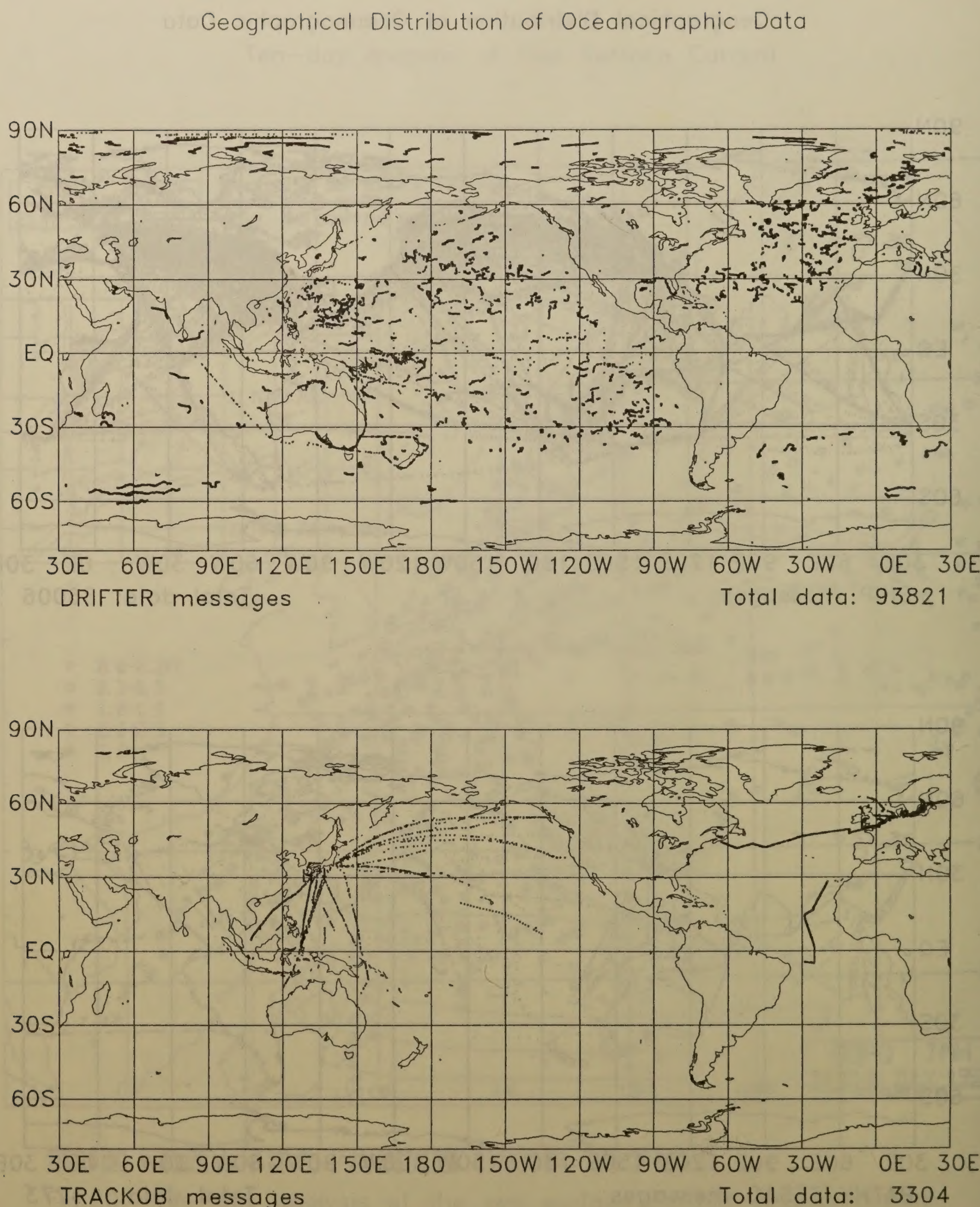
Geographical Distribution of Oceanographic Data





第21-1図　測点分布図(1993年 7月)

Fig.21−1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for JUL 1993.



第21-2図　測点分布図(1993年 7月)

Fig.21−2　Geographical distribution of DRIFTER messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for JUL 1993.

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